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(54) HEAT-SHIELDING SHEET

(57)Abstract:

PURPOSE: To obtain a heat-shielding sheet being permeable to visible rays, having a high absorptivity of near-infrared rays and being usable for a pressure-sensitive adhesive sheet, a printing sheet, an outdoor marking film or the like by adding a specified compound to a plastic resin.

CONSTITUTION: This sheet is made of a mixture comprising a plastic resin and 0.01–5wt.% aluminum compound or a diimonium compound. As the plastic resin, one permeable to visible rays is used. A vinyl chloride resin is particularly desirably used. Examples of the aluminum compounds used include IRA-002 and IRA-003, trademarks of products of Kyodo Chemicals, Ltd. Examples of the diimonium compounds used include IRA-022, etc. The thickness of the heat-shielding sheet is usually 10–1000μm. A pressure-sensitive adhesive layer is laminated on at least either surface of this sheet to form a pressure-sensitive adhesive sheet, and it is combined with an ultraviolet absorber to form an outdoor marking film.

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CLAIMS**[Claim(s)]**

[Claim 1] The thermal insulation sheet characterized by containing an aminium system compound or a G MONIUMU system compound 0.01 to 5% of the weight to plastic resin.

[Claim 2] The pressure sensitive adhesive sheet characterized by coming to carry out the laminating of the binder to one side or both sides of a thermal insulation sheet according to claim 1 whose thickness is 10-1000 micrometers.

[Claim 3] The pressure sensitive adhesive sheet characterized by coming to carry out the laminating of the binder which contains an aminium system compound or a G MONIUMU system compound 0.01 to 5% of the weight to one side or both sides of a sheet plastic.

[Claim 4] The printing sheet characterized by processing the front face of a sheet plastic in the ink which contains an aminium system compound or a G MONIUMU system compound 0.01 to 5% of the weight, or coming to process an aminium system compound or a G MONIUMU system compound by the finishing agent contained 0.01 to 5% of the weight.

[Claim 5] The outdoor-type marking film characterized by coming to carry out the laminating of the binder to one side of the thermal insulation sheet which was made to contain 0.01 - 5 % of the weight, and an ultraviolet ray absorbent for an aminium system compound or a G MONIUMU system compound 0.01 to 1% of the weight, and set thickness to 10-200 micrometers to polyvinyl chloride resin.

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DETAILED DESCRIPTION**[Detailed Description of the Invention]****[0001]**

[Industrial Application] This invention relates to the thermal insulation sheet which can be used in more detail suitable for a pressure sensitive adhesive sheet, a printing sheet, an outdoor-type marking film, etc. about a thermal insulation sheet.

[0002]

[Description of the Prior Art] Conventionally, the thermal insulation sheet was given to windowpanes, such as an automobile, the roof of a building, etc., and it was used in order to prevent too much heat operation by sunrays. The beam of light of the wavelength region currently called the so-called near infrared ray with a wavelength of 701-2100nm mainly does a heat operation among sunrays. As a sheet which has the heat cutoff nature which insulates by absorbing or reflecting such a near infrared ray, what contains the copper salt of an ammonium system compound, a thiourea derivative, and a certain kind of organic acid etc. as an infrared absorption agent, the thing which prepared the infrared reflecting layer were known conventionally.

[0003]

[Problem(s) to be Solved by the Invention] In JP,60-17330,U, it is the complex of the ammonium system compound of benzene dithiol molds, such as [screw (1-methyl -3, 4-dithio phenolate) nickel] tetrabutylammonium, and nickel 0.01-10g/m² The technique using the flexible sheet plastic to contain is indicated. However, the thing using such an ammonium system compound as an infrared absorption agent had inadequate heat cutoff nature highly [the absorption coefficient of a near infrared ray with a wavelength of 701-2100nm].

[0004] The heat ray screen which was made to contain a thiourea derivative and alt.phthalic-acid (meta) acryloyloxyethyl copper salt as an infrared absorption agent, was made to adhere on an elasticity base material, and carried out heat hardening into the rebound ace court agent containing a polysiloxane is indicated by JP,5-255643,A. However, it was difficult the screen to use thermoplastics, such as vinyl chloride resin, as a base material, since it manufactures by heat hardening, and since surface treatment of this heat ray screen was carried out by the rebound ace court agent containing a polysiloxane, the laminating of a binder and ink processing were difficult for it.

[0005] As a solar-heat cutoff film which prepared the infrared reflecting layer, what prepared the vacuum evaporationo layer of metal thin films, such as a coloring layer or aluminum, on base materials, such as polyester film, was known. However, this film was difficult to intercept most visible rays, if transparency is low and makes heat cutoff nature sufficiently high, and to use it for an aperture etc. by having prepared the coloring layer or the vacuum evaporationo layer of a metal thin film.

[0006] On the other hand, especially the air conditioning effectiveness of a summer is heightened and development of means by which thermal insulation measures, such as a residence, can be taken simple, such as pasting of a thermal insulation nature pressure sensitive adhesive sheet, is desired from viewpoints, such as attaining energy saving, in recent years. Furthermore, as an application of such a thermal insulation sheet, also in other fields, such as a marking film and a printing sheet, in order to give much more highly efficient nature, the possibility of the use is examined not only the application to the thermal insulation material for preventing that a solar-heat operation excessive mainly in the environment of habitation space etc. like before reaches etc. but in recent years. However, the thermal insulation sheet which can be used suitable for such an application is not yet developed.

[0007] In view of the above-mentioned present condition, this invention penetrates a visible ray, and its absorption coefficient of a near infrared ray is high, and it aims at offering the thermal insulation sheet excellent in the thermal insulation nature which can be used suitable for the application of a pressure sensitive adhesive sheet, a printing sheet, an outdoor-type marking film, etc.

[0008]

[Means for Solving the Problem] The summary of this invention is in the place which is made to contain an aminium system compound or a G MONIUMU system compound 0.01 to 5% of the weight, and constitutes a thermal insulation sheet to plastic resin. This invention is explained in full detail below.

[0009] In this invention, plastic resin is made to contain an aminium system compound or a G MONIUMU system compound as an infrared absorption agent, and a thermal insulation sheet is formed. Although it will not be limited especially if it has visible-ray permeability as the above-mentioned plastic resin, for example, polyvinyl chloride resin, polyester resin, polycarbonate resin, Pori methacrylic resin, etc. can be mentioned, since it excels in the pasting nature on the front face of a body when it excels in flexibility and flexibility and uses for a pressure sensitive adhesive sheet etc., polyvinyl chloride resin can be used suitable for the thermal insulation sheet of this invention among these.

[0010] Since the above-mentioned aminium system compound and the above-mentioned G MONIUMU system compound which are used as an infrared absorption agent in this invention are efficient, absorb the near infrared ray of an extensive wavelength region, are meltable to an organic solvent and excellent also in workability, they are indispensable in the configuration of this invention. It limits especially as the above-mentioned aminium system compound -- not having -- for example, common chemical company make -- the thing of marketing of IRA-002 and IRA[by the common chemical company]-003 grade can be used suitably. Since effective absorption wavelength is 800-1700nm, the above-mentioned IRA-002 and IRA-003 can be used especially suitable for this invention.

[0011] It is not limited especially as the above-mentioned G MONIUMU system compound, for example, the thing of marketing of IRA[by the common chemical company]-022 grade can be used suitably. Since effective absorption wavelength is 850-1250nm, the above-mentioned IRA-022 can be used especially suitable for this invention.

[0012] The content of the above-mentioned aminium system compound or the above-mentioned G MONIUMU system compound is 0.01 - 5 % of the weight to plastic resin. Since visible-ray permeability will fall if the absorption coefficient of a near infrared ray is low in the content of the above-mentioned aminium system compound or the above-mentioned G MONIUMU system compound being less than 0.01 % of the weight, heat cutoff nature is inadequate and it exceeds 5 % of the weight, it is limited to above-mentioned within the limits.

[0013] The additive may be added by the plastic resin which constitutes the thermal insulation sheet of this invention if needed. As the above-mentioned additive, a plasticizer, a stabilizer, etc. can be mentioned, for example.

[0014] The thermal insulation sheet of this invention can be used as the pressure sensitive adhesive sheet which carries out the laminating of the binder to one side or both sides by request, and has thermal insulation nature, and has the adhesion pasting nature to an objective front face. It is not limited especially as the above-mentioned binder, but although what is usually used for a pressure sensitive adhesive sheet can be used suitably, in order to use it suitable for the application of the thermal insulation sheet which can be used for front faces, such as a windowpane of a car or a house, and an outdoor tank, etc. simple, what raised weatherability, thermal resistance, etc. can also be used.

[0015] What is made to contain an ultraviolet ray absorbent 0.01 to 1% of the weight further to polyvinyl chloride resin as a desirable mode of the above-mentioned pressure sensitive adhesive sheet which has thermal insulation nature and has the adhesion pasting nature to an objective front face, carries out the laminating of the binder to one side, and is used as an outdoor-type marking film can be mentioned especially.

[0016] The ultraviolet ray absorbent containing the ammonium cinnamate which is not limited especially as the above-mentioned ultraviolet ray absorbent, for example, is concretely indicated by a benzophenone system ultraviolet ray absorbent, a benzotriazol system ultraviolet ray absorbent, a salicylic-acid system ultraviolet ray absorbent, a cyanoacrylate system ultraviolet ray absorbent, and JP,62-5882,A etc. can be mentioned. The addition of the above-mentioned ultraviolet ray absorbent is 0.01 - 1 % of the weight to plastic resin. If the rate of ultraviolet absorption is low in the addition of an ultraviolet ray absorbent being less than 0.01 % of the weight and it exceeds 1 % of the weight, visible-ray permeability will fall.

[0017] Although the thickness of the above-mentioned thermal insulation sheet changes with applications, it is usually 10-1000 micrometers. When carrying out the laminating of the binder to one side and considering as an outdoor-type marking film, it is desirable that it is 10-200 micrometers.

[0018] In other modes of this invention, the pressure sensitive adhesive sheet which carries out the laminating of the binder which contains an aminium system compound or a G MONIUMU system compound 0.01 to 5% of the weight, and has thermal insulation nature is formed in one side or both sides of a sheet plastic.

[0019] Especially if it has visible-ray permeability as plastic resin which constitutes the above-mentioned sheet plastic, it will not be limited, for example, polyvinyl chloride resin, polyester resin, polycarbonate resin, Pori methacrylic resin, etc. can be mentioned. It is polyvinyl chloride resin preferably.

[0020] It is not limited especially as the above-mentioned binder, but although what is usually used for a pressure

sensitive adhesive sheet can be used suitably, in order to use it suitable for the application of the thermal insulation sheet which can be used for front faces, such as a windowpane of a car or a house, and an outdoor tank, etc. simple, what raised weatherability, thermal resistance, etc. can also be used. The thickness of the above-mentioned binder is usually 30-40 micrometers.

[0021] The content of the aminium system compound in the above-mentioned binder or a G MONIUMU system compound is 0.01 - 5 % of the weight to a binder. Since visible-ray permeability will fall if the absorption coefficient of a near infrared ray is low in the content of the above-mentioned aminium system compound or a G MONIUMU system compound being less than 0.01 % of the weight, heat cutoff nature is inadequate and it exceeds 5 % of the weight, it is limited to above-mentioned within the limits.

[0022] still more nearly another voice of this invention -- it sets like and the printing sheet which processes the front face of a sheet plastic in the ink which contains an aminium system compound or a G MONIUMU system compound 0.01 to 5% of the weight, or processes an aminium system compound or a G MONIUMU system compound by the finishing agent contained 0.01 to 5% of the weight, and has thermal insulation nature is formed.

[0023] Especially if it has visible-ray permeability as plastic resin which constitutes the above-mentioned sheet plastic, it will not be limited, for example, polyvinyl chloride resin, polyester resin, polycarbonate resin, Pori methacrylic resin, etc. can be mentioned. It is polyvinyl chloride resin preferably.

[0024] It is not limited especially as the above-mentioned ink, but although the ink for printing usually used can be used, what raised weatherability, thermal resistance, etc. can also be used. As for the above-mentioned ink, the additive may be added according to the application. As the above-mentioned additive, pigments, such as a photoluminescent pigment, a fluorochrome, etc. can be mentioned, for example. It is not limited especially as the above-mentioned finishing agent, for example, the coat agent for a surface protection, ultraviolet curing mold urethane acrylate (trade name; the Seika beam 4643, Dainichiseika Colour & Chemicals Mfg. Co., Ltd. make), etc. can be mentioned.

[0025] The content of the above-mentioned ink, the aminium system compound in the above-mentioned finishing agent, or a G MONIUMU system compound is 0.01 - 5 % of the weight to the above-mentioned ink or the above-mentioned finishing agent. Since visible-ray permeability will fall if the absorption coefficient of a near infrared ray is low in the content of the above-mentioned aminium system compound or the above-mentioned G MONIUMU system compound being less than 0.01 % of the weight, heat cutoff nature is inadequate and it exceeds 5 % of the weight, it is limited to above-mentioned within the limits.

[0026] The thermal insulation sheet of this invention can be used suitable for the application of the thermal insulation sheet which sticks on the windowpane of cars, such as an automobile, a bus, and an electric car, the windowpane of a house, etc., and intercepts infrared radiation, a protection film, a printing sheet, an outdoor-type marking film, the vinyl sheet for agriculture, the film for interlayers of a glass laminate, etc.

[0027]

[Example] Although an example is hung up over below and this invention is explained to it in more detail, this invention is not limited to these.

[0028] 0.16 % of the weight (IRA-002, common chemical company make) of aminium system compounds was blended with the example 1 polyvinyl-chloride (henceforth "PVC") resin 100 weight section, and the compound which consists of the Ba-Zn system stabilizer 2 weight section as the DOP26 weight section and a stabilizer as plasticizers as an infrared absorption agent, it was processed into it with the test roll temperature of 180 degrees C, and the sheet with a thickness of 60 micrometers was obtained.

[0029] the permeability in the wavelength of 200-900nm of the evaluation approach profit **** sheet was measured by Shimazu recording spectrophotometer UV-2200 (Shimadzu Corp. make), and the result was shown in drawing 1.

[0030] The sheet was obtained and measured like the example 1 except having used the aminium system compound (IRA-003, common chemical company make) as an example 2 infrared-absorption agent. The result was shown in drawing 2.

[0031] The sheet was obtained and measured like the example 1 except having used the G MONIUMU system compound (IRA-022, common chemical company make) as an example 3 infrared-absorption agent. The result was shown in drawing 3.

[0032] The sheet was obtained and measured like the example 1 except having not added an example of comparison 1 infrared-absorption agent. The result was shown in drawing 4.

[0033] It was clear that the thermal insulation sheet of this invention absorbed the beam of light with a wavelength of 200-900nm 80% or more according to the example.

[0034]

[Effect of the Invention] The thermal insulation sheet which was excellent in the heat cutoff nature which can be used

especially suitable for a pressure sensitive adhesive sheet, a printing sheet, an outdoor-type marking film, the vinyl sheet for agriculture, etc. with this invention can be offered.

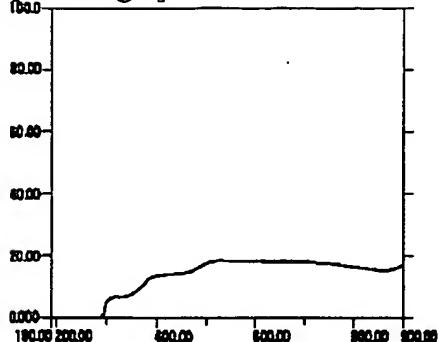
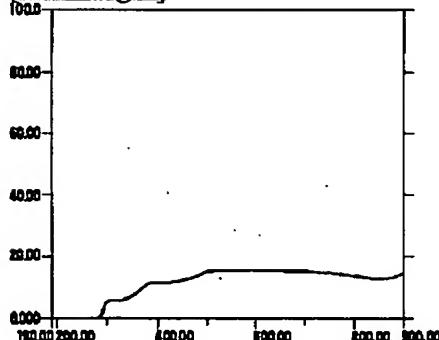
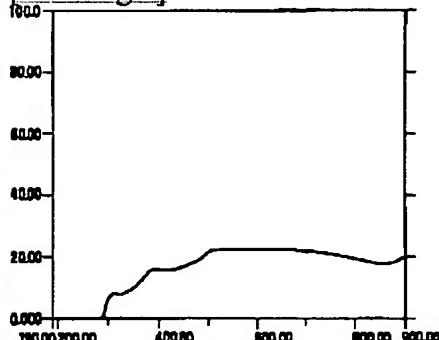
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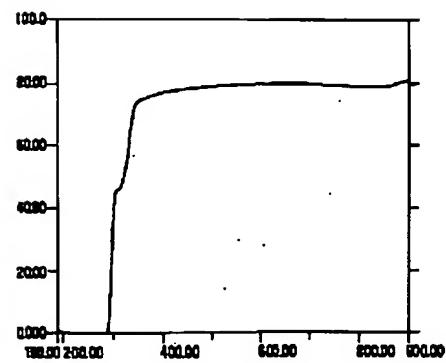
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DRAWINGS

[Drawing 1]**[Drawing 2]****[Drawing 3]****[Drawing 4]**



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